## 4-09.1 BRIDGES

**4-09.1 (1) BRIDGES USED IN PLACE.** Existing bridges at large stream crossings carrying light traffic may be used in place under certain conditions. Such structures may be narrower and have less loading capacity than the requirements in Figure 4-04.1. Where a location study report does not include a recommendation for the disposition of such structures, the district makes a recommendation, before completing the survey, to the Design Division. Narrow bridges used in place are properly signed with advance warning signs. Guardrail is used at the bridge ends to delineate the width transition.

**4-09.1 (2) BRIDGE DRAINAGE.** Bridges across natural streams are provided with drains to drain the bridge surface. Surface runoff from bridges designed as grade separation structures is provided for by either a drainage system on the structure or at the ends of the bridge. Where a drainage system is not provided on the bridge, the roadway plans provide for runoff from the bridge surface by using drain basins shown in the standard plans. Where interchange ramps with curb are involved at the end of a bridge, consideration should be given to carrying bridge drainage along the ramp curb to an outlet on the ramp in lieu of using curb and gutter or drain basins at the concrete approach pavement. The drainage facility beyond the limits shown in the standard plans is designed to meet the existing conditions at the bridge involved, and is generally shown on the culvert section sheets. The district should make a recommendation for handling drainage when submitting bridge survey reports for concurrence by the Bridge Division at the bridge field check or on the bridge field check memorandum.

**4-09.1 (3) BRIDGE APPROACH SLABS.** Bridge approach slabs are included in the bridge plans prepared by the Bridge Division. Payment for bridge approach slab is included in bridge estimated quantities.

**4-09.1 (4) CONCRETE APPROACH PAVEMENT.** Concrete approach pavement, as detailed in the standard plans, are specified on the plans at the end of all bridge approach slabs. Details such as type and location of traffic barrier should be coordinated with the Bridge Division. Concrete approach pavement is to be used regardless of mainline pavement type. When pavement or bridge drainage required the use of drain basins they will be constructed within the limits of the concrete approach pavement, as detailed in the standard plans for drain basins.

**4-09.1 (5) COLOR OF STRUCTURAL STEEL PAINT.** The color of structural steel paint shall be gray (Federal Standard #26373) or brown (Federal Standard #30045) except when approved by the district engineer and the following conditions are met:

- An agreement with a local entity sponsoring the color is made indicating the local entity shall pay for all costs associated with providing necessary test data, pay for all costs associated with the finish coat in excess of typical costs associated with standard colors, and pay for future costs for applying the finish coat in excess of typical costs associated with standard colors as a condition of continuing the unique color. (The agreement should stipulate that the color will be maintained in the future as mutually agreeable by both parties. The additional cost to the local entity would be determined at that time. Since we require a previously approved "system" be used, the prime coat will be the same as a standard system and should not fail prematurely. If the color fades prematurely and the local entity wants it repainted, they would pay proportionately. If the color fades and the local entity does not want to pay their share, the district would decide when future repainting occurs.) Provide a copy of the agreement with the local entity to the Division Engineer, Bridge, at least three (3) months prior to the plans due date for letting.

- Only approved systems from currently approved manufacturers will be considered (List maintained by the Materials Division).

- The district or local entity shall provide certified performance data from an independent testing laboratory on samples formulated with the finish coat of the desired color from two paint manufacturers. The Materials Division maintains the performance data required and can be contacted for further information.

**4-09.2 CLIMBING LANES FOR TWO LANE HIGHWAYS.** Traditional climbing lanes form three-lane cross sections when used in conjunction with two-lane highways. They are generally applied as a spot improvement, most often on steep sustained grades which cause heavy vehicles, particularly heavy trucks, to travel at slow speeds. This reduces capacity, creates platoons, and increases delay. Additionally, safety problems may arise when the reduction in speed of heavy trucks exceeds 15 km/h (10 mph) along the grade. The use of climbing lanes must be justified and have prior approval from the Design Division. Recommendations are usually made at the preliminary plan stage.

AASHTO presently warrants a climbing lane wherever the speed of truck, with a mass per watt ratio of 300 (300 lb/hp), is reduced by 15 km/h (10 mph) or more and the volume and percentage of heavy trucks justify the added cost.

**4-09.2 (1) DESIGN.** The 1985 Highway Capacity Manual and the AASHTO Green Book are the basis for determining the need for climbing lanes. Basic layout of a climbing lane is illustrated in Figure 4-09.2. Standard shoulders are used throughout the length of the climbing lane unless a lesser shoulder width would substantially reduce costs. In no case shall the shoulder width be less than 1.2 m (4 ft). Signing and delineation are essential to the operation of climbing lanes. Climbing lanes should be extended over crests whenever possible to facilitate truck acceleration.

**4-09.2 (2) SPEED REDUCTION.** It is desirable to provide a climbing lane, as an extra lane on the upgrade side of a two-lane highway, where the critical length of grade is exceeded, i.e., where the length of grade causes a reduction of 15 km/h (10 mph) or more in the speed of the loaded vehicles.

**4-09.2 (3) JUSTIFICATION - CAPACITY AND COST.** Justification for climbing lanes where the critical length of grade is exceeded is considered from the standpoint of highway capacity. Passenger car equivalents so derived are given for various combinations of percent of grade, length of grade, and level of service. In the matter of justifying the cost of providing a climbing lane, another factor is considered. Highway users expect a higher degree of congestion on individual steep grades than over long sections of highways and will tolerate some reduction in freedom of operation on grades, provided the restriction is not extreme or unreasonable. As a matter of practice, the service volume on any individual grade should not exceed that attained by using the next poorer level of service from that used for the basic design of level sections. The one exception is that the service volume derived from employing level of service D should not be exceeded. The 15 km/h (10 mph) speed reduction, which generally corresponds to the speed variation between adjacent levels of service, is the accepted basis for determining the location at which to begin climbing lanes.

**4-09.3 CURBS, CURB AND GUTTER.** Curbs, and curb and gutter, are used to channelize and guide traffic, to mark traffic lanes, to define medians for safety, to simplify handling drainage, and to reduce right of way requirements.

When curbs are constructed directly beneath guardrail the curb height will be 100 mm (4").

**4-09.3 (1) TYPES.** Standard curb and curb and gutter types are detailed in the standard plans. Standard types are used whenever practical. Barrier type curbs are used in conjunction with other parallel vertical elements such as walls, bridge rails, adjacent to sidewalk, etc.

**4-09.3 (2) CURB OFFSETS.** Curbs are designed and located so that they are not hazardous to traffic. Barrier type curbs are offset from the edge of traffic lanes by at least 300 mm (1 ft), except curbs adjacent to auxiliary lanes 3.6 m (12 ft). At least a 1.2 m (4 ft) curb offset is desirable for short curb sections and for islands.

**4-09.3 (3) INTEGRAL CURB.** Integral type curbs are either doweled to the pavement or constructed monolithically with the pavement. Integral curb may be used along auxiliary lanes and may also be used along through traffic

lanes where there is not sufficient room for curb and gutter. Payment for integral curb is made based upon curb heights (150 mm (6 in.) and under, and over 150 mm (6 in.)) regardless of type. Type of curb is indicated on the 2B sheets.

**4-09.3 (4) STANDARD CURB AND GUTTER.** The standard curb and gutter section is used adjacent to through traffic lanes in lieu of integral curbs wherever there is sufficient room. The plans specify type of curb and gutter.

**4-09.3 (5) PLANS.** Standard curb sections and curb and gutter sections are used if at all practicable. If conditions merit the use of non-standard curb or curb and gutter section, the plans show complete details. The plans clearly indicate the location, type, and quantities for all curbs, and curb and gutters. Integral curb on paved approaches is measured and paid for as part of the approach and is not listed as a separate pay item.

**4-09.4 DISPOSITION OF EXISTING ROADS.** Recommendations for the disposition of existing roads are included in the location study report. The disposition of existing roads requires the submission of a "Change in Route Status Report" to the Office of Transportation Management System. The disposition of existing roads is approved by the commission. The Change in Route Status Report is a report which is used to initiate action concerning the ultimate disposition of the old road. This report is needed for *all* projects involving right of way regardless of changes to existing roads.

**4-09.4 (1) CRITERIA FOR RETENTION.** When the improvement of existing routes in the highway system involves relocations, portions of the old route may be retained for commission use under the following conditions, or any combination of these conditions.

**4-09.4 (1) (a) ABSORB IN NEW ROUTE**

- When any portion of the old right of way becomes part of the new right of way. Termini limits of permanent right of way purchase shall normally be used to determine the length to be absorbed.
- When old right of way is needed for an outer roadway and is contiguous with right of way for main lanes.

**4-09.4 (1) (b) RETAIN AS A ROUTE IN SAME SYSTEM**

- When necessary to retain continuity of a route in the same system.
- When necessary to provide a business route to serve a substantial business community which has been bypassed and the old route is the logical solution.
- When the release of that part of the route will create a condition not consistent with the functional service objectives of that system.

**4-09.4 (1) (c) TRANSFER TO ANOTHER SYSTEM**

- When the old section is necessary in order to maintain continuity of a route on another system.
- When that part of the route is needed to provide the functional objectives of another system.

**4-09.4 (1) (d) RETAIN AS SERVICE ROAD ON NEW ROUTE.** When a short section of the old route adjoins at one or both ends a section of road on or to be retained on the state highway system, and the right of way is not contiguous with the new right of way, it may be retained as a service road if one of the following conditions exist.

- Due to not connecting or being close to a local road, it would be unreasonable to require maintenance by the local political subdivision.

- Some special condition which dictates this procedure. Usually this condition will involve access provisions.

**4-09.4 (1) (e) RETAIN FOR FUTURE USE.** When the portion of the old route is not needed for the above or for access to properties consideration shall be given to any possible future use by the commission. This may include use by maintenance forces, future improvements, scenic use, or in some cases sale or trade as excess property.

**4-09.4 (2) CRITERIA FOR REMOVAL.** When a portion of the old route is not needed for commission use, it may be removed from the state-maintained system. The district will secure a reaction from the local government to accepting the conveyance of the old route in writing and forward a copy to the Office of Transportation Management Systems.

- Convey by quit claim deed to the city, county, or other government agency which can legally accept a deed for the right of way. Relinquishments must be accepted by agencies before the project is advertised for letting.

- Convey by quit claim to adjacent property owners.

- Abandon,if the city, county, or agency involved refuses to accept the quit claim deed for the right of way.

- Abandon, if the portion of the old route is not needed for public road access to any properties, in which case it is not necessary to ascertain if the city, county, or agency involved will accept a quit claim deed for the right of way.

**4-09.4 (3) SKETCH.** A line drawing sketch is prepared to show the proposed disposition of existing roads. This sketch is developed on a letter-size or multiple of a letter size reproducible sheet. An example of this type sketch is illustrated on Figure 4-09.3. The existing route should be shown as parallel lines 3 mm (0.1 in.) apart with the space between left blank to permit coloring. The following are features to be checked in preparation of the sketch.

- Quality of drafting and clarity of material presented.

- Equations from final plans and new plans in proper section.

- Comparison with new route plans. Termini limits of the disposition shall normally be shown at the extreme limits of permanent right of way purchase on the new project. New stationing is to be equated to the old stationing at tie points, at beginning and ending of job, and at any connections to existing routes or crossovers of existing route. Both the new and old stationing should be shown at points where a change of disposition occurs.

- Length of all sections based on old stationing.

- Make sure that affected routes are covered. Show all on one sketch if at all possible.

- Disposition against location study recommendation and other decisions reached as a result of public hearings or preliminary plan development. Explain deviations fully in letter of transmittal.

- Overall logic of disposition, as suggested in Subsection 4-09.4.

**4-09.4 (4) SUBMITTAL.** The original tracing of the sketch and one colored print indicating the various types of disposition recommended are sent to the Office of Transportation Management Systems by the district after preliminary plan approval and generally near the time that plans are approved for right of way purposes. The following color code is to be used:

- Absorb - Red.
- Abandon or convey to adjacent property owners-Green.
- Convey to _____ County - Yellow.
- Convey to the City of _____ - Purple
- Convey to _____ (Agency) - Orange
- To be Retained - Brown.
- Transfer to Supplementary System - Blue.

The accuracy of the sketch will be reviewed along with the recommendations for disposition. Once this review has been completed, the sketch and the recommendations will be forwarded to the assistant chief engineer by the Office of Transportation Management Systems for final review and further handling.

When approved by the assistant chief engineer, the Change in Route Status Drawing and appropriate plans will be provided to the district right of way agent so that quit claim deeds can be prepared for those sections of the old route which are to be conveyed to others.

When it is necessary to revise or adjust a local road or street, the right of way should be acquired in the name of the state. After completion of construction, the deeds for the local right of way outside normal highway right of way should be forwarded to the agency involved, with plans and/or sketches showing the affected roads or streets.

**4-09.5 EROSION CONTROL.** Control of erosion is given careful consideration during design.

**4-09.5 (1) PERMANENT EROSION CONTROL.** Permanent erosion control measures are installed to reduce maintenance costs and to improve appearance..

**4-09.5 (1) (a) DITCHES.** After grading quantities have been balanced to the extent that grades are approximately set, and after culvert flow lines have been set, all ditches are analyzed to determine the necessary erosion control measures. The method of determining the quantity of runoff to ditches and the velocity of flow in ditches is given in Chapter IX. Details for ditch liners and paved ditches are shown in the standard plans.

**4-09.5 (1) (b) SLOPES.** Erosion of slopes is controlled by use of interception ditches and by application of proper slope protection measures such as fertilizing, mulching, seeding, or sodding. The extent and selection of the necessary erosion control measures required for the protection of slopes is based on good engineering judgment, in that less expense should be incurred for these items on improvements in rural areas than in urban areas. In built-up urban areas where any necessary maintenance is costly and difficult to perform, it is essential to reduce erosion to a minimum and provide slopes with a pleasing appearance that will blend with the surrounding improvements.

**4-09.5 (1) (c) FERTILIZING, SEEDING, AND MULCHING.** Fertilizing, seeding, and mulching are the minimum erosion control measures applied to improvements. Necessary erosion control measures are determined from a soil analysis made by the Materials Division from soil samples obtained by the district. The Materials Division submits one copy of the soil test to the district and one to the Maintenance Division. The Maintenance Division furnishes the rates of application and types of fertilizer, soil neutralizer, seeding, and types of mulch to the district. Where circumstances will not permit soil tests, the district submits recommendations for the rates of application and the types of fertilizer, soil neutralizer, seeding, and types of mulch to the Maintenance Division for approval. The district includes the types and rates in the proposal as a job special provision. If practicable, the types and rates are constant within any one

project. The number of different types and rates are held to a minimum for simplification and to reduce the number of bid items.

**4-09.5 (1) (c) 1. FERTILIZING.** Earth shoulders, medians, and the entire roadway outside the roadbed limits, excluding rock or surfaced areas, are fertilized and limed. Separate payment is not made for fertilizing and liming areas to be sodded or seeded by contract.

When using native plants, the fertilizer and effective neutralizing material recommendations are generally half of the standard rate. Nitrogen (N) should not exceed 45 kilograms per hectare (40 lb/acre) and phosphoric acid ($P_2O_5$) and potash ($K_2O$) should not be less than 45 kilograms per hectare (40 lb/acre).

**4-09.5 (1) (c) 2. SEEDING.** Earth shoulders, medians, and the entire roadway outside of the roadbed limits, excluding solid rock and surfaced or sodded areas, are seeded. A guide for seeding mixtures and rates of application is shown in Figure 4-09.7.

The use of native grasses and wildflowers is recommended for rural, undeveloped areas that are not regularly mowed and that can be easily viewed by the traveling public. Requests for wildflower areas are reviewed by the Maintenance Division on an individual basis with seeding and fertilizer recommendations made to suit each situation.

The plans specify the seeding mixture, rate of application, and the areas to be seeded in hectares (acres). In special cases, the seeding may be applied by maintenance forces from construction funds, if requested by the district and approved by the Maintenance Division. Where the work is performed by contract, the seeding item includes fertilizing and liming.

**4-09.5 (1) (c) 3. MULCHING.** Four types of mulching are provided in the standard specifications. Type 2, Type 3 or Type 4 Mulch is generally specified since considerably more protection is provided than Type 1 for very little additional cost. The type of mulch used is at the option of the district. Care should be exercised in the use of Type 4 Mulch as it cannot properly be embedded in rocky soils or on steep slopes. Where, in the judgment of the district and the Maintenance Division, Type 4 Mulch can properly be embedded, consideration should be given to the use of this type in lieu of mulch and netting for medians and flat bottom side ditches provided the maximum velocity controls shown on Figure 9-04.3 for netting are not exceeded.

All seeded areas except earth shoulders or areas otherwise protected with some type of erosion control are mulched. All four types of mulch are indicated on the plans by area in hectares (acres). If practicable, the same type mulch is used throughout a project. Where more than one type is used, the limits of each type are clearly indicated on the plans.

Plastic netting may be considered for use to retain mulch in ditches. Netting is not normally used on backslopes and fill slopes. Velocity control limitations for netting used as a ditch liner are set out in Figure 9-04.3. Where mulch can properly be embedded, the use of Type 4 Mulch without netting may be considered for medians and flat bottom side ditches provided the maximum velocity controls shown on Figure 9-04.3 are not exceeded.

**4-09.5 (1) (d) SOD.** Sod is used as a permanent type erosion control measure on slopes. In built-up urban areas, it is generally necessary to sod all slopes and areas disturbed during construction to prevent erosion and to provide a pleasing appearance that will blend with the surrounding improvements. Where appearance or the need is not critical, other erosion control measures are considered.

**4-09.5 (1) (e) TOPSOIL.** Topsoil may be placed in areas where the natural soil will not produce grass or sod and where a quick growth of grass or sod is necessary to prevent erosion or to improve appearance. This item is usually used in islands, medians, and on slopes in highly improved urban areas where it is impracticable

to build the fertility of the soil with fertilizer. Where slopes are designed for topsoil, care is exercised to prevent slides. The existing soil should be loosened and mixed with a portion of the topsoil before placing the remainder of the topsoil. Rock or shale cuts may require benching to hold the topsoil on the slope. The plans show the location on which the topsoil is to be placed, the depth and the volume of topsoil required in cubic meters (cubic yards) and any special conditions for placement of the topsoil.

**4-09.5 (1) (f) INTERCEPTION LEVEES AND DITCHES.** The plans provide for the construction of interception levees and ditches at the top of earth backslopes of cuts at all locations where the natural ground slopes toward the backslope.

**4-09.5 (2) TEMPORARY EROSION AND SEDIMENT CONTROL.** A temporary erosion and sediment control plan is required for all projects that disturb any land area, including borrow areas.

The purpose of the temporary erosion control plan is to prevent the sediment resulting from the contractor's activities from leaving the right of way. It is not the intent to clean up drainage from adjacent property, although this may occur. The erosion control plan should attempt to intercept the sediment before it enters crossroad drainage. The designer should use special precautions when the right of way is next to sensitive areas, such as lakes, etc. Temporary erosion control measures are not to be placed in natural drainage or streams.

The designer must determine that sufficient right of way or easement is available for the construction and maintenance of all erosion control devices. This is particularly important when using sediment basins and silt fences. Easements should be acquired at all drainage inlets and outlets.

Generic erosion control plans are available as special sheets. These special sheets will be inserted in the plans by the Design Division. The district will include in their index of job special provisions the title "Temporary Erosion and Sediment Control" with the notation "To be inserted by the Design Division". It is the designer's decision whether separate plan sheets for temporary erosion and sediment control are prepared. The erosion control plans should indicate the right of way limits including temporary and permanent easements. Construction limits are shown. All permanent drainage structures and temporary erosion control features are shown. Temporary erosion and sediment control pay items are itemized on the 2B Sheets, including size and depths required for sediment basins.

**4-09.5 (2) (a) TEMPORARY BERMS.** Temporary earth berms constructed at the edge of the embankment during the grading operation will prevent slope erosion and direct run off to a down (slope) drain or catchment area. These berms are used on all grading projects. The quantities are estimated by multiplying the length of embankment in the profile by 1.5. Type "A" berms are constructed at the end of each day's operations on embankments. Type "B" berms are constructed when embankment operations are shut down over an extended period.

**4-09.5 (2) (b) TEMPORARY PIPE SLOPE DRAINS.** Temporary pipe slope drains carry water from a work area to a lower elevation. Temporary pipe slope drains should be placed at 150 m (500 ft) intervals or as directed by the engineer. The length of pipe needed is estimated at the average height of fills. For slope drains constructed at 150 m (500 ft) intervals, a 200 mm (8 in.) smooth conduit or a 300 mm (12 in.) corrugated conduit is suitable.

**4-09.5 (2) (c) DITCH CHECKS.** Ditch checks are used to contain sediment on the construction site. The spacing is in accordance with the spacing chart as shown in the plans. The quantities for pay items are as computed.

**4-09.5 (2) (c) 1. ROCK DITCH CHECKS.** Rock ditch checks should be limited to ditches with grades of 4% or less.

**4-09.5 (2) (c) 2. STRAW BALE DITCH CHECKS.** The filter fabric may be eliminated for grades of 2% and less. This ditch check may be used for drainage areas less the 1.2 hectares (3 acres).

**4-09.5 (2) (c) 3. SILT FENCE DITCH CHECKS.** These ditch checks may be used for drainage areas less than 0.8 hectare.

**4-09.5 (2) (d) SEDIMENT BASIN.** This is a basin that is excavated or an area that is dammed. The basin will have a ponded volume of 125 $m^3$ per hectare (1815 cubic ft/acre) of drainage area. It is used for drainage areas of 0.8 to 2.0 ha (2 to 5 acres) or where a roadway cut ditch exceeds 300 consecutive meters (1000 feet) in length. Larger drainage areas or longer cut ditches should be broken into smaller areas if possible. If a sediment basin is used on an area larger then 2.0 hectares (5 acres) the size will become very large. The allowable depth of a sediment basin ranges from a minimum of 0.6 m (2 ft) to a maximum of 1.8 m (6 ft). The allowable width ranges from 1.5 to 6.0 m (5 to 20 ft), and the allowable length ranges from 7.5 to 60 m (25 to 200 ft).

**4-09.5 (2) (e) TEMPORARY SEEDING AND MULCHING.** This is an item used on all projects. Quantities are estimated as 10% of the permanent erosion control items for seeding and mulching.

**4-09.5 (2) (f) STRAW BALES.** A barrier of baled straw is used to prevent sediment from leaving the construction site. It is used in ditches as ditch checks or along the toe of slope of right of way for fills less than 3.0 m (10 ft) high.

**4-09.5 (2) (g) SILT FENCE.** Silt fence is used to contain sediment on the construction site. It can be used for ditch checks, along the toe of the fill, along the right of way line, or parallel to streams. It is used to capture sediment from fills over 3.0 m (10 ft) high. It can be used around a drop inlet to prevent silt from entering the pipe system.

**4-09.5 (2) (h) TEMPORARY PIPE.** Temporary pipes are used to carry water under a haul road, etc. The pipe is sized based on a two-year storm.

**4-09.5 (2) (i) SEDIMENT REMOVAL.** Quantities are estimated using eight cubic meter (10 cubic yards) per sediment basin, one cubic meter (one cubic yard) per ditch check, and one cubic meter per 40 m (one cubic yard per 100 ft) of silt fence. A fixed price has been established for this item.

**4-09.6 EMBANKMENT PROTECTION.** Types of embankment protection are (1) Rock Fill, (2) Rock Blanket, (3) Fully Grouted Rock Fill, (4) Grouted Rock Surface, (5) Revetment, and (6) Concrete Slope Protection.

**4-09.6 (1) ROCK FILL.** The placement of embankments constructed with rock to the controlled gradation required for rock fill is paid for on the basis of placing rock fill by volume. Rock fill is specified where necessary to control embankment erosion, to prevent capillary action from saturating embankments, and to prevent the entrapment of water by the embankment. Sometimes this can be accomplished by constructing the embankment with rock excavation without specifying rock fill. In this case, separate payment is not made for placing the rock. Where rock fill is specified, the plans provide the item for its payment. If the plans do not provide sources for the rock fill material, the plans provide the item for furnishing rock fill. If the plans provide sources for the rock fill, the excavation of the material is paid for under the appropriate roadway excavation item. Rock fill material is secured from roadway excavation, if practicable. If not, the plans provide areas from which the rock fill material is to be obtained. If neither is practicable, the plans provide the item for furnishing rock fill. The plans clearly indicate data by appropriate notes. The plans specify location and dimensions as required to cover the extent of rock fill, and include quantities for its construction.

**4-09.6 (2) ROCK BLANKET.** Rock blanket is used and specified as required to protect roadway slopes, at bridge ends and culverts, and to protect stream banks. The requirement for rock blanket at bridge ends and at large culverts is specified on the bridge field check memorandum. The requirement for rock blanket at other locations is determined during plan field checks. Rock blanket at bridge ends extends to at least 9 m (30 ft) along the embankment from the bridge abutment on the upstream side, and to at least 6 m (20 ft) along the embankment on the downstream side, unless otherwise specified on the bridge field check memorandum. Rock blanket is constructed to a thickness of from 460 to 900 mm (1.5 to 3.0 ft) , depending on stream

velocities and protection needed. The standard specifications define two types of rock blanket. Type 1 rock blanket is specified where the stream velocity is less than 1.8 m/s (6 ft/s). Type 2 rock blanket is specified at bridge ends and at other locations where the stream velocity is 1.8 m/s (6 ft/s) or more. The rock blanket is extended to at least 600 mm (2 ft) below natural ground or finish grade at bridge ends, and to at least 600 mm (2 ft) below the stream flow line where used on stream banks, unless otherwise specified on the bridge field check memorandum. If the plans provide sources for the rock blanket, the excavation of the material is paid for under appropriate roadway excavation items. Rock blanket material is secured from roadway excavation, if practicable. If not, the plans provide areas from which the rock blanket material is to be obtained. If neither is practicable, the plans provide the item for furnishing rock blanket. The plans clearly indicate these data by appropriate notes. The plans specify type, location and dimensions for rock blanket and include quantities for its construction.

**4-09.6 (3) FULLY GROUTED ROCK FILL.** Fully grouted rock fill is used only where extreme high stream velocities will endanger rock fill without grout. Fully grouted rock fill is usually used in the vicinity of low-water crossings only. Fully grouted rock fill is paid for by volume which includes furnishing and placing the rock and grout. The plans show location, dimensions, and quantities.

**4-09.6 (4) GROUTED ROCK SURFACE.** Grouted rock surface is used to prevent erosion of rock fill or rock blanket where stream velocities exceed approximately 2.4 m/s (8 ft/s) and sometimes at bridge ends for lesser velocities. The plans show limits and quantities for grouted rock surface.

**4-09.6 (5) REVETMENT.** Revetment is used on stream banks in lieu of rock blanket where the thinner protection provided by the revetment is adequate and where stream bank stability will permit. Light stone revetment is used for stream velocities of approximately 2.4 m/s (8 ft/s) or less or where the height of the revetment is 1.2 m (4 ft) or less. Heavy stone revetment is used where stream velocities exceed approximately 2.4 m/s (8 ft/s) or where the height of the revetment exceeds 1.2 m(4 ft). Grouted light stone revetment is specified where the stream velocity exceeds approximately 1.5 m/s (5 ft/s). Grouted heavy stone revetment is used where the stream velocity exceeds approximately 2.4 m/s (8 ft/s). The plans show location, dimensions, and quantities for revetment and specify either light or heavy stone revetment or grouted light or heavy stone revetment.

**4-09.6 (6) CONCRETE SLOPE PROTECTION.** Concrete slope protection is usually used under the ends of all grade separation structures, but it may be used at other locations where necessary to prevent slope erosion. Concrete slope protection under grade separation structures is specified on the bridge field check memorandum where required. Concrete slope protection is constructed to a 100 mm (4 in.) thickness, unless other wise specified on the plans. The 100 mm (4 in.) thickness is usually used under grade separation structures. Thicknesses greater than 100 mm (4 in.) may be specified at other locations. The plans show locations, dimensions, thickness if other than 100 mm (4 in.), and quantities for concrete slope protection.

**4-09.6 (7) PLANS.** The plans specify the location and type of embankment protection. No direct payment will be made for any excavating or for other work necessary in preparing the subgrade, trenching or for backfilling required.

**4-09.7 FENCING.** All interstate highways shall have continuous fencing on either the right of way line or at or near the access-control line except in areas of precipitous slopes or natural barriers, or where it can be established that such fencing is not necessary to effectively preserve access control.

Compensation for fencing to the property owner will not be allowed where the plans provide for fencing.

Fencing types should consist of woven wire and barbed wire fence 1.4 m (54 in.) high for rural and some suburban areas, and chain link fence minimum 1.5 m (60 in.) high for urban and suburban areas and other developed areas where pedestrian control is desirable. Chain link fence shall be used through the limits of rest areas.

Where outer roadways are provided, the use of guard cable may be considered as a substitute for fencing at the access control line when the primary purpose of fencing is to prevent vehicular movements.

Completed sections of interstate highways should be reviewed and fencing provided in accordance with this criteria. Fencing is to be placed regardless of previous compensation for fencing to property owners.

All fence so provided on the plans shall be maintained by the state.

Fencing for other fully limited access highways should be determined on each individual project's needs but generally will not be required.

Where generally acceptable private fences exist, they may be utilized to develop the necessary continuous fencing but maintenance shall remain the responsibility of the owner.

**4-09.7 (1) PURPOSE.** The purpose of this policy is to reasonably guarantee access control to the motorist. It is not the intention of this policy to provide fencing on an indiscriminate basis since all fencing provided by the plans is to be maintained by the state. Fencing provided under this policy is access control work not normally anticipated to be done by maintenance forces. At isolated locations effective control can be achieved involving a minimum of work through minor grading, ditching, placement of posts, etc., and is preferable to the development of extensive control by fencing.

**4-09.7 (2) AGRICULTURAL AREAS.** Fencing may be provided in intensive agricultural areas where cropping on the right of way is likely to occur or where cultivating methods result in conditions requiring extra or more extensive maintenance operations than normal.

**4-09.7 (3) DRIVE GATES.** Drive gates may be provided at selected locations to assist maintenance operations. Drive gates may also be required at locations involving certain utilities. The use of drive gates should be held to a minimum.

**4-09.7 (4) PLANS.** Fencing is indicated on plans by appropriate symbol at the time right of way plans are approved. Separate approval of fencing is not required when used in accordance with fencing policy. Plans shall show all drive or walk gates. Plans shall specify height and type of fence as required and the number of walk and drive gates. Double-drive gates are considered as a single unit. The type of material for the fence (zinc-coated steel, aluminum coated steel, aluminum alloy and vinyl coated steel) is generally at the contractor's option and is not specified in the contract except where special conditions may dictate the use of a specific type. Figure 4-09.4 shows typical installation plans for various conditions. The use of floodgates in fencing should be avoided to the greatest extent possible. To eliminate right of way payment for temporary fencing, a special provision should be provided to require fencing as first order of construction on a project.

**4-09.7 (5) GUARD CABLE.** Guard cable is used in conjunction with fencing under the fencing policy to preserve access between outer roadways and through lanes. The guard cable placement is referenced to the outer roadway shoulder. See standard drawing and Figure 4-09.4. Guard cable is indicated on the plans by appropriate symbol.

**4-09.8 GUARDRAIL.** Guardrail is used to protect traffic from roadside obstacles or to restrict or prohibit traffic movements. The basic principal for the use of guardrail to protect traffic from obstacles is that guardrail will be used when the severity of an accident involving the obstacle would be greater than the severity of an accident involving the protective guardrail.

**4-09.8 (1) DEFINITIONS**

**TYPE A** - single W beam rail with 1905 mm (6' 3") post spacing.

**TYPE B** - double W beam rail with 1905 mm (6' 3") post spacing generally for use in median.

**TYPE D**, -, single W beam rail with 3810 mm (12' 6") post spacing for use at end of road or street.

**TYPE E** - single thrie beam rail with 953 mm (3' $1^1/_2$") post spacing.

**Approved Crashworthy End Terminal -** For use on the National Highway System, an end terminal must have successfullypassed NCHRP 350 test criteria and must have been approved by the FHWA.

**END ANCHOR -** a modified Breakaway cable terminal without a buffer end to develop the full strength of the rail system.

**EMBEDDED END ANCHOR -** an end anchorage system for rail whereby the rail is embedded in a concrete block and buried in the backslope.

**ROCK FACE END ANCHOR -** an end anchorage system for rail whereby the rail is bolted to a rock face.

**BLOCKOUT -** spacer block to separate the guardrail beam from the post used on all types of guardrail.

**4-09.8 (2) END TREATMENT.** Where practical, the guardrail should be extended outside of the clear zone, or where possible, the guardrail end should be embedded into an adjacent embankment or attached to a solid rock face to eliminate the need for a crashworthy end terminal. If not practical, all approach ends of guardrail, as illustrated by the standard plans, are provided with an approved crashworthy end terminal and a separate payment is made for each crashworthy end terminal. The district should indicate on the plans where a crashworthy end terminal is to be installed and should include in the proposal job special provision index the title of the appropriate crashworthy guardrail terminal special provisions with the notation "to be inserted by Design Division". All downstream ends on two-way roadways are provided with an approved crashworthy end terminal. All downstream ends on dual lane highways are provided with an end anchor to develop the strength of the rail.

**4-09.8 (3) HIGH FILLS.** Guardrail for embankments is specified on plans for roads with 400 ADT or more. For roads under 400 ADT, guardrail is optional, however, good design judgment should require guardrail when conditions warrant. Guardrail will not normally be warranted because of embankment height for projects where clear zones are utilized. However, guardrail may be warranted as shown on Figure 5.1 in the AASHTO Roadside Design Guide. Combinations of embankment height and slope that plot above the curve indicate a need for guardrail. Combinations plotting below the curve indicate conditions are less severe without guardrail. However, other factors contributing to accident severity such as hazards located either on or at the toe of the slope should be taken into consideration.

**4-09.8 (4) FIXED OBJECTS.** Guardrail protection for fixed objects such as trees or utility poles may be necessary. If this protection is required, the protection is determined from the near lane on one direction roadways and from both lanes on a two direction roadway. Guardrail is warranted in advance of any fixed object located within the clear zone provided the object is potentially more damaging than the guardrail if struck by a vehicle and the object cannot be economically removed, relocated, or made crashworthy by means of breakaway type construction. The fixed object is termed the area of concern and the required type and length guardrail depends on the size of the object, the distance from the travel way, the ADT, and the design speed. The length of need of guardrail is the length of the obstacle plus the length of the approach barrier adjacent to traffic (and opposing lane, if needed). The length of need and the flare rate of the guardrail shall be determined in accordance with the procedures contained in Section 5.6.4 of the AASHTO Roadside Design Guide utilizing an encroachment angle of 15 degrees. The general geometrics covering the length of need are illustrated on Figure 5.31 of the Roadside Design Guide.

**4-09.8 (5) BRIDGE ENDS.** Guardrail is placed at bridge ends in accordance with typical locations shown in the standard plans for all roads. Approved crashworthy end terminals are provided on guardrail placed for bridge end protection. Guardrail placed for bridge end protection is anchored to the bridge end by a bridge anchor section. Where guardrail at the exit end of a one-way bridge is necessary because of a high fill or other condition, the guardrail is connected to the bridge anchor section. Guardrail is not generally used to protect traffic from the ends of bridges carrying a crossroad or street over the through lanes in developed areas where

speed controls exist or sidewalks are provided. If however, at ends of such bridges the roadway is in a high fill or has sharp curvature, guardrail may be considered.

**4-09.8 (6) BRIDGE PIERS AND SIGN TRUSSES.** Guardrail is specified for protection of traffic from bridge piers and sign trusses with the exception of those piers and trusses where the pier or truss footing is located outside the clear zone. Typical treatments are indicated in the standard plans.

**4-09.8 (7) SIGNS.** Guardrail is specified to protect traffic from sign posts which cannot be equipped with a breakaway assembly. Typical treatments are indicated in the standard plans.

**4-09.8 (8) OUTER ROADWAYS.** Criteria for guardrail use on outer roadways is the same as for other roads except for the shoulder side adjacent to a through lane. Guardrail is specified along outer roadways where the outer roadway is 3 m or more above the main roadway, and the shoulder of the outer roadway is less than 7.5 m from the top of the roadway backslope. Sometimes it is more economical to move the outer roadway back sufficiently to eliminate the requirement for guardrail. Guardrail along outer roadways is installed with the face of the rail facing the outer roadway. Type B rail may be required if the guardrail is within the limits of the clear zone for the through lanes.

**4-09.8 (9) HEADWALLS.** Guardrail is not used to protect traffic from headwalls located outside of the shoulder line of roadways without clear zones unless warranted by high fills. An exception to this would be on an interstate safety modification project where clear zones are not added and where it may not be economically feasible to extend a large box culvert to locate the headwall outside the clear zone point.

**4-09.8 (10) MEDIANS.** See Section 4-04. Guardrail may be specified in medians to provide a positive barrier. Guardrail may also be specified to convert an existing raised curb median to a barrier median provided the guardrail is placed with the face at the face of the curb and the center of the rail 535 mm (21 in.) above the pavement elevation at the curb face. Type B guardrail may be used on a raised median width of 600 mm (2 ft) face to face. For greater widths, two single lines of Type A guardrail will be required. For medians of variable widths a detail in the standard plans provides for transition from Type B to Type A guardrail. Approved crashworthy end terminals are added only at the beginning and ending of a total run of guardrail and not at each break caused by intersections and crossovers. Breaks caused by intersections and crossovers will be closed by means of a crashworthy special end treatment. For medians on divided pavements where grade differential will not permit standard clear zones, the slope should be modified to provide as safe a slope treatment as possible. Guardrail will not be required except for exceptional or unusual conditions.

**4-09.8 (11) RESTRICTED LATERAL CLEARANCE.** When piers or other obstacles require guardrail treatment, the back of the guardrail post is to be placed 1.2 m (4 ft) from the pier or obstacle. Where the clearance obtained is less than 1.2 m (4 ft) but more than 0.6 m (2 ft), 7.5 m (25 ft) of Type E guardrail shall be used preceding and through the limits of the obstacle. There will be situations with narrow shoulders or with curbed medians when encroachment is not permitted. In such cases, Type E guardrail should be specified requiring 7.5 m (25 ft) preceding the obstacle and extending through the limits of the obstacle as required. The minimum offset to the obstacle can be eliminated completely by attaching the rail to the obstacle by use of a bridge anchor section.

**4-09.8 (12) BARRICADE OF EXISTING STREETS AND ROADS.** Where a street or road which is essentially rural in nature is to be closed for a period of time not to exceed approximately five years, permanent barricades as shown on Standard Plan 612.10 are specified. Where the closing of the street or road is anticipated to exceed approximately five years duration in essentially rural areas, and for closing streets or roads in essentially urban areas regardless of time, either Type IV Object Markers only or a combination of Type IV Object Markers and Type D guardrail is specified. Where no hazard exists beyond the end of the closed street or road for a reasonable distance, Type IV Object Markers are sufficient for delineation. Where a hazard exists beyond the end of the closed street or road which is considered equal to or greater than that created by the use of guardrail, a combination of both Type IV Object Markers and Type D guardrail is specified.

**4-09.8 (13) PLANS.** Guardrail details and typical locations for installation are shown in the standard plans. Guardrail is shown by proper legend on the plan sheets and the station location and quantities are tabulated on the 2B sheets. Quantities are tabulated in 3180 mm (12' 6") increments. Curved sections of guardrail are to be installed on curves with a radius of 45 m (150 ft) or less. The plans specify the lengths of curved guardrail and the radius of curvature. Curved guardrail is not tabulated separately on the plans. Examples of guardrail delineation and tabulation is shown in Section 4-10.

**4-09.8 (14) URBAN SECTION, CURB AND CURB AND GUTTER.** Where barrier curb is used, guardrail is placed with the face at the face of the curb and the center of the rail 535 mm (21 in.) above the pavement elevation at the curb face. Where mountable curb is used, guardrail is placed with the face at the edge of the usable shoulder and the center of the rail 535 mm (21 in.) above the shoulder elevation. Where curb and gutter is used, guardrail is placed with the face at the face of curb and the center of the rail 535 mm (21 in.) above the gutter line. When curbs are constructed directly beneath guardrail, the curb height shall be 100 mm (4 in.).

**4-09.9 MANHOLES.** Manholes are specified for sanitary sewers and storm sewers at pipe intersections and at locations necessary to provide access to the sewer. Other requirements for manholes in sanitary and storm sewers are given in Chapter IX. Manholes are not installed in traffic lanes if such an installation can be avoided.

**4-09.9 (1) CONCRETE.** Precast concrete manholes are specified in the plans unless special conditions require cast in place concrete manholes. When precast manholes are specified in a contract the contractor will be permitted to substitute cast in place manholes. Details for each type are shown in the standard plans. The standard manhole will accommodate pipes up to and including 1200 mm (48 in.) in diameter. Larger pipes require special manhole designs. Concrete manholes are used in storm sewer systems. Concrete manholes are used in sanitary sewers, except where local ordinances require brick manholes.

**4-09.9 (2) BRICK.** Brick manhole details are shown on standard plans. Brick manholes are used in sanitary sewers where required by local ordinances. Brick masonry is used to adjust existing manholes in accordance with the details shown on standard plans.

**4-09.9 (3) FRAME AND COVER.** All manholes, whether concrete or brick, require a manhole frame and cover as detailed on standard plans. The frame and cover is tabulated on the plans with the manhole, indicating the type of cover required. A frame with a locking cover is specified when a manhole is located in a pavement area.

**4-09.9 (4) PLANS.** The plans show the location, size, and depth of concrete manholes. The size of a precast manhole is the maximum diameter section required. The plans show the location, size, and depth of brick manholes, and the depth of the foul water drop where required. The plans also show the number and type of manhole frames and covers required.

**4-09.10 PRECAST CONCRETE DROP INLETS.** Precast concrete drop inlets are specified in the plans unless special conditions require cast in place concrete drop inlets. When precast drop inlets are specified in the contract, the contractor will be permitted to substitute cast in place drop inlets to the dimensions required for precast drop inlets. Details for each type are shown in the standard plans.

**4-09.10 (1) MEASUREMENT FOR PAYMENT.** Measurement of precast concrete drop inlets, complete in place, will be measured to the nearest 0.5 m (1 foot) for the depth of the drop inlet, measurement being the vertical distance from the top of the inlet as shown on the standard drawing. Grates and bearing plates are paid for as a separate item.

**4-09.10 (2) TYPE T DROP INLETS.** Where two or more units of Type T drop inlets are required, measurement for payment will be the number of units times the depth, i.e., three units at 1.5 m (6 ft) depth, the pay quantity being 4.5 m (18 ft).

**4-09.10 (3) 2B SHEET PROCEDURE (COLUMN HEADINGS).** The suggested column headings for the accepted arrangement on the 2B Sheet is as follows:

- Col. 1 Station
- Col. 2 Location
- Col. 3 Type - A, B, C, etc.
- Col. 4 METRIC Depth "D" - In 100 mm increments as detailed in culvert sections. Depth is rounded to the nearest 0.5 m for each inlet for payment listed under appropriate size
  ENGLISH Depth "D" - In 3 inch increments as detailed in culvert sections. Depth is rounded to the nearest foot for each inlet for payment listed under appropriate size, i.c., "D" of 3' 6" would be 4.0' "D" of 3' 3" would be 3.0'
- Col. 5 Grates and Bearing Plates Weight from Standard 614.10 by size of opening.
- Col. 6 Curb Inlet - Number required
- Col. 7 Class 3 Excavation
- Col. 8 Remarks - Number and size of pipe openings required, etc.

**4-09.11 PIPELINES.** Methods of handling pipeline items and other utility items are given in Chapter VII. The plans show pipeline owner, location, elevation, and disposition. Plan details are developed to minimize pipeline adjustment. Grades and location can sometimes be changed to avoid pipeline adjustment without materially affecting roadway costs. This particularly applies to low type roads.

**4-09.12 PRIVATE UNDERPASSES.** Private underpasses such as cattle passes are considered only when they can be economically justified by their service and use. Cattle passes are built without bends if possible and so that the outlet can be seen from the inlet end. Such structures are, in effect, always paid for by the property owners they serve, or others. Where the right of way is being purchased, the difference in cost between the underpass structure and a structure required to handle the runoff from the drainage area is deducted from the damages to the property. Where the right of way is being furnished by others without cost to the department, the difference in cost is paid by the property owner or others. In all cases when private underpasses are provided, the files include a record of the economic justification.

**4-09.12 (1) RELATED TO ACCESS CONTROL.** When a highway project severs a property, access under the structure will be allowed the landowner. Plan design is not to be altered to accommodate owner needs unless justified by appraisal. This item if further discussed in Section 4-02.

**4-09.12 (2) TYPES.** Bridges, concrete box structures, or large pipes may be used for underpass structures. For cattle passes, a pipe 1650 mm (66 in.) in diameter or a box culvert 1.8 m (6 ft) in height may be used. Pipe structures may be specified with paved inverts to increase their utility for use as underpass structures. Vehicular underpasses may be of any reasonable size and are usually box culverts.

**4-09.12 (3) PLANS.** The following note is placed on the plans for each appropriate structure "Access Is allowed under the bridge (or through the culvert)". In addition to the regular note for culverts, the culvert note on plans includes a note "Cattle Pass", "Vehicular underpass", or "Private Underpass", so that the plans will be a record of the agreement with the property owner to construct underpass structures.

**4-09.13 JOB NUMBERS.** Improvements are identified by job numbers in the following manner: J7P0414. The first character is always the letter "J". The second character is the district number with zero used for district 10. The third character is the system (I, P, S, U, or X). The fourth through seventh characters are a unique four-digit number assigned by the Office of Transportation Program Management in the Highway Right of Way and Construction Program Book. The eighth character, if there is one, is a letter of the alphabet which designates a different stage of the same basic job number.

**4-09.14 RAILROADS.** Methods of handling railroad items are in Chapter VII.

**4-09.14 (1) TIES TO RAILROADS.** The plans show ties between the intersection of the survey centerline and railroad stationing at the centerline of the track. When two railroads are involved ties are shown for each intersection. The railroad alignment, right of way, and topography are shown for a minimum distance of 150 m (500 ft) each side of survey centerline. Particular railroad facilities to be shown on the plans include signal and communication poles, signal boxes, signals, and buildings. Where improvements parallel railroads, the plans include ties to all railroad stationing and to track curve points, the railroad curve data, and railroad right of way limits.

**4-09.14 (2) ENCROACHMENTS ON RAILROAD RIGHT OF WAY.** Improvements paralleling railroads are located if possible to eliminate encroachments on the railroad right of way. Such improvements are located to at least minimize the number of encroachments on the railroad right of way. The railroad right of way is clearly shown on the plans and encroachments are indicated on the plans as construction easements. On highway improvements with access control, the appropriate legend denoting the access control is placed on the common highway-railroad right of way line between the improvement and the railroad. This also requires the purchase of abutters rights from property owners on the opposite side of the railroad right of way.

**4-09.14 (3) SIGHT DISTANCE AT HIGHWAY-RAILROAD GRADE CROSSINGS.** A triangle of right of way or sight distance and unobstructed area easements are obtained in each quadrant at all highway-railroad grade crossings not to be protected with flashing lights, to the extent that a vehicle approaching the grade crossing is able to see a train approaching the crossing in time to stop prior to reaching the crossing. The limits of the additional right of way or sight distance and unobstructed area easement triangles are defined by connecting a point on the highway at a distance from the crossing, based on the stopping sight distance for the highway design speed, and a point on the railroad at a distance from the crossing, based on train speed. The stopping sight distance and factors for various train speeds are tabulated in Figure 4-09.6. If these are not practicable, due to physical obstruction such as buildings, flashing light signal installations may be required. These installations are approved by Design Division prior to right of way negotiations. Where the railroad or highway is in a cut the additional area is graded (based on 1.2 m to 1.2 m; based on 4 feet to 4 feet) as required to obtain sight distances in accordance with Figure 4-09.6. Grading in these areas requires additional right of way or easements beyond the limits normally required. Where grade crossings are to be protected with flashing lights, the additional right of way or easements are not required. In such cases the grades adjacent to the grade crossings are established so that the driver of a vehicle approaching the crossing can see the flashing lights at a distance from the crossing at least equal to the stopping sight distance tabulated in Figure 4-09.6. The determination for installation of flashing lights requires negotiation with various agencies and is handled by the Design Division. Additional right of way is used in lieu of sight distance and unobstructed easements where fences, weeds, crops, etc., will obstruct the sight distance. This restricts the use of easements to locations where both the railroad and the highway are on fill heights above such features.

**4-09.14 (4) PLANS.** The plans show "G" project limits. The estimates, tabulation of quantities, etc., are divided accordingly. The plans show complete details of all encroachments upon railroad right of way, and additional right of way or sight distance and unobstructed area easements where required at all highway-railroad grade crossings. If the additional right of way or sight distance and unobstructed area easements are not in accordance with Figure 4-09.6, the letter of transmittal explains the reasons for not following these criteria. If a reduced design speed is used to establish the easement limits, the reduced design speed is furnished in the letter of transmittal.

**4-09.15 CLEAR ZONES.** Appropriate typical sections are selected for a project using Figure 4-04.1 and recommendations from the location study report.

**4-09.15 (1) DEFINITION.** The clear zone is defined as the roadside border area measured from the edge of the pavement that is available for the safe use by errant vehicles as determined in accordance with Chapter 3 of the AASHTO Roadside Design Guide.

**4-09.15 (2) USE OF CLEAR ZONES.** Clear zones are provided where the design speed of the roadway is 80 km/h (50 mph) or more. For less than 80 km/h (50 mph), clear zones should be considered if economically feasible.

Non-traversable slopes or fixed objects should be removed, relocated, or shielded by a barrier if they are within the indicated minimum clear zone width and if it is cost effective to do so. Higher speeds will result in vehicles traveling further before recovery. Horizontal curvature will increase the likelihood of a vehicle leaving the travel way and will increase the distance it will travel. Steeper fill slopes will also increase the distance the vehicle travels off the travel way. It is important in the implementation of the clear zone concept that the clear zone distances should not be used as boundaries for introducing roadside hazards such as bridge piers or trees. These should be far from the travel way as is practical. The clear zone width should be applied with good judgment. If an obstacle lies just beyond the clear zone, it should be removed or shielded if costs are reasonable. Conversely the clear zone should not be obtained at all costs. Limited right of way or high construction costs may lead to the installation of a barrier or possibly no protection at all. As may be noted, roadside slopes apply an important part in the clear zone width determination. Fill slopes of 1:6/1:3 are standard, i.e., a 1:6 fill slope extending from the shoulder line out for a distance necessary to obtain the clear zone then break the fill slope to 1:3 or flatter. If feasible, the flattening of slopes is preferable to installation of guardrail. In cut sections, the ditch configuration must be considered if clear zones are provided. Figure 3.7 in the Roadside Design Guide should be checked for preferred ditch cross sections. Ditch sections must be within the shaded portions of the guides for use with clear zones. Background for this procedure is contained in Appendix A of the Roadside Design Guide. Any deviation from the standard slope will be considered special conditions and should be justified by costs or other considerations.

**4-09.15 (2) (a) FOR BRIDGES AND CULVERTS.** Clear zones, when used, shall be carried full width to bridge ends. Where the existing roadway is to be incorporated into completed facility as part of the main roadway, the use of clear zones will be considered on an individual project basis.

The use of the clear zone typical sections is not applicable for small culvert replacement projects where the intent is to continue the service of the road without upgrading it. In this case, the typical sections used in the original construction should be used except that the roadbed width should not be less than 7.2 m (24 ft).

In shallow fills and in cuts where box or pipe culvert normally require a head wall to be located in the clear zone, the structure should be extended to place the head wall at the outer edge of the clear zone. The slope of the clear zone will then require modification to provide cover over the entire surface.

**4-09.15 (2) (b) RAMPS.** Flattened slopes or clear zones should be used on ramps to eliminate the use of guardrail. It is the intention to use guardrail only to protect bridge ends within the interchange area.

**4-09.15 (2) (c) UNUSUAL CONDITIONS.** Where steep sidehill conditions exist and standard clear zone slopes will not catch the ground, steeper slopes must be used. In these cases, the clear zone may be omitted and guardrail used at the shoulder line. Desirable minimum length for elimination of clear zone is 150 m (500 ft) but no case less than 75 m (250 ft).

For long fill sections through a reservoir project, clear zones can be eliminated and guardrail used at the shoulder lines.

Speed change lanes adjacent to main roadways are to be placed within main roadway clear zone with no further widening of clear zone. The clear zone is always located adjacent to and measured from the normal edge of the pavement of the main roadway including climbing or continuous auxiliary lanes.

**4-09.16 TEMPORARY CONNECTIONS.** Temporary connections are provided on the plans as required to connect improvements to existing surfaces, and to connect lanes at the termini of divided lane facilities. Temporary connections will usually be used by traffic longer than such items as bypasses and are therefore designed to a higher standard.

**4-09.16 (1) SURFACING.** Temporary connections are usually surfaced with the same surface type as that used on the improvement being planned. An exception is that, where concrete pavement is used, reinforcement and base

may be omitted. Temporary connections constructed with concrete pavement are jointed along the edges of main traffic lanes in such manner that the ultimate removal of the connection will be simplified and can be accomplished without disturbing the through pavement.

**4-09.16 (2) ALIGNMENT.** Temporary connections are usually constructed using a minimum radius of 585 m (maximum curvature of three degrees). Specific conditions may merit the use of flatter or sharper curves. Temporary connections used at the terminus of divided lane facilities are constructed using reversed curves with a minimum radius of 585 m (maximum curvature of three degrees), as illustrated on Figure 4-09.5. Temporary connections may be designed with or without superelevation.

**4-09.16 (3) LOCATION.** Temporary connections are located in such manner that will provide good sight distance for traffic approaching the connection and in such manner that drainage structures required for the connections are held to a minimum. The required sight distance for traffic approaching temporary connections is twice the stopping sight distance based on design speed. These sight distance requirements are the same as those tabulated in Table 4-05.4.

**4-09.17 UTILITIES.** Policies and methods of handling utility matters are given in Chapter VII.

All existing utilities within right of way limits are shown by proper legend on the plans. In addition, the owners of all utilities are shown and the disposition of the utility by an appropriate note such as "Leave in Place", "Remove", "Abandon", or "Relocate". The plans show the elevation of all underground utilities, and the approximate clearance for overhead utilities. The plans show the location of all new or relocated utilities within right of way limits and their owners. On plans for other than the interstate system, the new or relocated utilities can be shown by legend or with an appropriate note such as "Power line owned by the Able Power Company is to be relocated by owner along left right of way line between _____ and _____".

**4-09.18 TEMPORARY U-TURN MEDIAN OPENINGS ON FREEWAYS.** U-turn median openings for use by the general public are not provided on freeways.

Temporary U-turn median openings for contractors to haul materials are permitted only at locations indicated in the traffic control plan. Crossovers shall be signed in accordance with the traffic control plan.

**4-09.18 (1) RURAL.** Where the spacing of interchanges is greater than approximately 5 km (3 miles), a U-turn median opening may be provided at a favorable location about halfway between interchanges. Where the spacing of interchanges is greater than about 10 km (6 miles) U-turn median openings may be provided so that the distance between such openings or between a U-turn median opening and an interchange is not greater than about 5 km (3 miles).

U-turn median openings should be located only where there is open, well-above-minimum stopping sight distance along the freeway. They should be at least 1.5 km (1 mile) from any ramp terminal or other access connection such as a safety rest area.

**4-09.18 (2) URBAN.** Due to the close spacing of interchanges on urban freeways, U-turn median openings are not needed for the operation of official vehicles and in general they should not be provided.

**4-09.19 WEIGH STATIONS.** The general locations for truck-weigh stations are designated by the Maintenance Division, generally some time in advance of the development of plans for highway improvements. Weigh stations on interstate routes are located not less than 1.5 km (1 mile) from interchanges and on all other routes at locations that provide good sight distance for traffic approaching the weigh station. When the district has proceeded with the survey and with the development of the preliminary plan to the extent that tentative grades have been determined, a definite location for the weigh station is decided upon by district personnel accompanied by representatives of the Maintenance Division. Weigh station locations are decided upon prior to completing the preliminary plan. Their locations are indicated on the preliminary plan, and the Maintenance Division is furnished with a print of the preliminary plan prior to preliminary plan approval.

**4-09.19 (1) DESIGN DETAILS.** Design details for weigh stations are provided by the Design Division.

**4-09.19 (2) PLANS.** The plans provide for the complete installation of the weigh station. The district is responsible for the geometric layout, grading, drainage, and paving quantities including parking areas, and all other normal roadway items. The Design Division will provide all plans and specifications for the scale, scale pits and the weigh station building and its appurtenances. Federal funds can be provided for all construction items. Separate bid items will be provided for the scale and pit, generally financed from highway planning funds, and the building, space heater, air conditioner, cabinets, wells, etc., the non-highway items which are financed from Maintenance and Highway Patrol funds. Special provisions and drawings are available from the Design Division and should be requested by the district for plan preparation on projects involving a weigh station. The special provisions or drawings may be modified by the district when necessary to meet special conditions. Where entrances are specified from outer roadways to weigh stations located on limited-access highways, the type of entrance is indicated by including the notation "Gate Entrance - For Official Use of Weigh Station Only" on the plans. These entrances may be located within the limits of the no-right-of-access line; however, the no-right-of-access line is not broken or terminated at the entrance. Other data is listed on the 2B sheet under entrances and approaches.

**4-09.20 WORK BY MAINTENANCE.** Sometimes it is desirable to have maintenance forces perform certain small items of construction work which cannot conveniently or economically be included in the contract. It is not intended to have maintenance forces perform an undue amount of construction work. Therefore, items of work considered for maintenance forces must have prior approval by the Maintenance Division and/or the Traffic Division. Typical types of work are detour signing, preparation of surfaces for resurfacing, and bituminous surface treatment for stage construction on short bridge replacement projects.

If the district determines that it is practical to have maintenance forces perform certain items of work, the district submits its recommendation to the Maintenance Division and/or the Traffic Division for approval, and a copy of this recommendation is forwarded to the Design Division. All approved work is shown on the estimate and tabulation of quantities as a non-contractual item to be financed from construction funds. On federal aid projects, federal funds can be obtained for such work if it is not considered normal maintenance operations. Normal maintenance work will be non-participating and must be financed 100% with state funds. On interstate routes, federal aid is requested for maintenance force work estimated to cost $2,000.00 or more. On other state routes federal funds will be requested for maintenance force work estimated to cost $10,000.00 or more. An estimate of costs should be made to substantiate the request for funds and should include all labor, materials and equipment. The estimate must be submitted when approval of the work is requested.

Detour signing, which are those signs necessary to route traffic over existing roads which are not part of the construction project, can be financed from construction funds only if the estimated costs is $200 or more. Detour signing is exclusive of the signing of traffic control plan.

**4-09.21 JUNKYARD CONTROL.** Each fiscal year, the Highway Right of Way and Construction Program includes certain junkyards to be screened, if feasible or possible. If screening is not possible or economically feasible, junkyards will be acquired as a LAST RESORT, and a permanent restrictive easement will be obtained preventing any further activity resulting in an unsightly view to the traveling public. When feasible, junkyards may be screened either by chain link fence, or by appropriate vegetation and/or earthen berms.

The department can acquire easements for screening purposes either by negotiation or condemnation.

A reasonable height for man-made screening is approximately 2.4 m (8 ft). Vegetation must be of such density as to screen the junkyard from sight of the traveling public within a three year period after initial planting and be of a variety that will screen the junkyard from view the year round. The department agronomist should be consulted concerning vegetative screening. Earthen berms may be used for screen or to increase the vertical height of vegetation or fence.

The department will design and contract to build the screen either on existing right of way or a permanent easement outside the right of way. The screen will be maintained by the department whether it is placed on right of way or on a permanent easement. It is not feasible to construct a screening fence to a height greater than 2.4 m (8 ft).

When developing plans, develop the plan sheets to show complete ownership, 300 m (1000 ft) line, land ties, all necessary dimensions, bearings, junkyard license number, and area under permit with relation to highway, and identify elevation needed to screen. Include general location of junk and any buildings, structures, or improvements involved and suggested method of screening.

**4-09.22 PERMITS.** Bridge and roadway construction in a floodplain, wetland, or over a defined waterway will require one or more of the following permits:

**4-09.22 (1) SECTION 404 PERMITS.** An application for a Section 404 Permit from the Corps of Engineers should be submitted for any stream crossing requiring a bridge survey (All drainage areas exceeding 1.5 square miles). Section 404 Permits are also required if fill material is placed in a wetland even if no stream is crossed.

The Corps of Engineers has jurisdiction over waters of the United States and more specifically, any stream meander shown as a blue thread on a USGS quadrangle map. An application for a Section 404 Permit is to be submitted for construction or maintenance activities within jurisdictional waters of the United States or in wetlands. Authorization in the form of a permit from the Corps of Engineers must be received prior to the commencement of any such activities. If it cannot be reasonably determined by the district whether a Section 404 Permit will be required for the construction or maintenance activities for any project, the environmental section of the Preliminary Studies Division should be contacted for assistance.

Requirements for Section 404 Permits are set by the Corps of Engineers and are changed frequently. The most current forms and instructions should be used.

There are several nationwide permits which adequately cover most construction and maintenance activities. These nationwide permits are issued for specific activities, such as maintenance, survey activities, bank stabilization, road crossings, United States Coast Guard approved bridges, minor discharges, minor dredging, approved categorical exclusions, headwater and isolated water discharges and temporary construction, access and dewatering. In some instances, the Corps of Engineers may determine that proposed construction and maintenance activities are not covered by any of the nationwide permits. They may then issue an individual permit which is project specific, or may determine that the activities are covered by a general permit which is issued on a regional basis.

Individual and general permits will include conditions which must be followed during the construction and maintenance activities. All nationwide permits are governed by the Nationwide Permit General Conditions and Section 404 Only Conditions. Specific additional conditions may also be associated with each permit. Section 401 Water Quality Certification must also be obtained as a condition of obtaining the Section 404 permit. All applicable permits, conditions and water quality certification are to be included in the construction project proposal. Some permits require a preconstruction notification (PCN) prior to commencement of any construction or maintenance activities. All permits require compliance certification upon completion of construction or maintenance activities. The conditions of the permit must also be followed for maintenance activities.

It should be noted that for high profile projects or projects that have significant environmental concerns, the Corps of Engineers may require six to nine months to issue the permit.

Special care should be used to properly establish the Corps of Engineers ordinary high water elevation. This elevation is determined by a line on the bank established by the fluctuations of water and indicated by the clear natural line impressed on the bank or by the limit of vegetation growth. This elevation in almost every case will cause the elevation to be well down in the channel below the top of the bank.

The completed application with original sketches and additional information sheet should be submitted to the environmental section of the Preliminary Studies Division after the final bridge layout is completed. Copies of letters from the Missouri Department of Conservation (MDC) which document our coordination of the project with the MDC should be attached when available. The application for construction or maintenance activities requiring an individual or general permit should be submitted at least one year prior to plan completion. For projects governed by nationwide permits including those requiring a PCN, the application should be submitted at least six months prior to plan completion.

**4-09.22 (2) SECTION 401 CERTIFICATION.** Section 401 Water Quality Certification must be obtained from the Water Pollution Control Program of the Department of Natural Resources in order to obtain any Section 404 Permit. A copy of the Corps of Engineers Section 404 permit application and supporting data is submitted to the Department of Natural Resources to request water quality certification for the construction or maintenance activity simultaneously with submission of the Section 404 permit application to the Corps of Engineers. The request for Section 401 Water Quality Certification should be made at least one year prior to plan completion for individual and general Section 404 permits and six months prior to plan completion for nationwide Section 404 permits. This submission is made by the Design Division with the coordination of the environmental section of the Preliminary Studies Division.

The Water Pollution Control Program of the Department of Natural Resources has established conditions for all nationwide permits. It will be necessary to comply with these conditions for activities in any Corps of Engineers jurisdictional waters or wetlands.

The State of Missouri has promulgated an antidegradation requirement in the Water Quality Standard regulations (10 CSR 20-7.031). This policy coincides with the purposes of the Clean Water Act to maintain and restore the biological, chemical and physical integrity of the waters of the United States. As such, three outstanding national resource waters, the Current, Jacks Fork and Eleven Point Rivers, are protected by exceptionally restrictive water quality criteria. Additionally, thirty-four other streams and wetlands have been identified as outstanding state resource waters (Figure 4-09.8). These state resource waters are also recognized as having special importance, and may also require stringent water quality management. Therefore, all nationwide permit applications within the watershed of waters designated as outstanding national resource waters or within the designated segments of outstanding state resource waters require a preconstruction notification (PCN) to the Corps of Engineers and Department of Natural Resources.

**4-09.22 (3) COAST GUARD PERMIT - NAVIGABLE WATERWAYS.** Permits for construction of bridges over the Missouri or Mississippi Rivers will be obtained by the Bridge Office from the United States Coast Guard.

**4-09.22 (4) FLOODPLAIN DEVELOPMENT PERMITS.** Communities (cities, counties or states) participating in the National Flood Insurance Program (NFIP) are required to regulate construction in the floodplain. Communities accomplish this by requiring permits for development in the floodplain. The State Emergency Management Agency (SEMA) has been granted authority to regulate floodplain development by state agencies and to issue floodplain development permits for their projects.

The Support Center will obtain the necessary floodplain development permit(s) from SEMA for construction in a regulated floodplain. The Bridge Division will obtain permits for projects which include structures in a regulated floodplain and the Design Division will obtain permits for other projects involving roadway fill in a regulated floodplain. The district will be responsible for determining whether a floodplain development permit is required on the project, and for providing to the appropriate Support Center office any project information necessary to obtain the permit.

**4-09.22 (4) (a) FLOODPLAIN AND SPECIAL FLOOD HAZARD AREA.** The floodplain is defined by the Federal Emergency Management Agency (FEMA) as any land area susceptible to being inundated by water. The 100-year flood, or a flood with a one percent annual chance of being equalled or exceeded, has been adopted by FEMA as the base flood for the NFIP. The water surface elevation of the base flood is known

as the base flood elevation (BFE). A special flood hazard area is land in the floodplain inundated by the 100-year flood and is commonly referred to as the "100-year floodplain." A floodplain development permit is required for any construction in a special flood hazard area. Special flood hazard areas are typically shown as "A" zones on flood insurance maps.

**4-09.22 (4) (b) FLOODWAY.** Encroachment on the floodplain, such as roadway fill, reduces the flood-carrying capacity, increases the flood heights of streams and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For the purposes of the NFIP, the floodway concept is used as a tool to assist in this aspect of floodplain management. The 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of the stream plus the portions of the adjacent overbanks which must be kept free of encroachment in order to pass the base flood. The floodway fringe is the area between the floodway and floodplain boundaries (see Figure 4-09.9).

Construction in the floodway which causes any increase in the BFE is prohibited. In order to issue a floodplain development permit for construction in the floodway, the community must receive a "No-Rise Certification," signed and sealed by a registered professional engineer, which certifies that the proposed construction will cause no increase in the BFE.

Where construction in an existing floodway is absolutely necessary, and such construction will cause an increase in the BFE, the floodway must be revised so that the proposed construction no longer causes an increase in the BFE or is no longer in the floodway. Flood insurance map revisions are obtained from FEMA through the community(ies) with jurisdiction. The map revision process requires a detailed hydraulic analysis and the cooperation and approval of all communities involved. In general, obtaining a map revision is a difficult and time-consuming process and should be avoided if at all possible.

**4-09.22 (4) (c) REVIEW OF FLOOD INSURANCE MAPS.** The Support Center Preliminary Studies Division receives two copies of the Flood Insurance Study and associated maps from FEMA for streams subject to the National Flood Insurance Program. One copy is sent to the Bridge Division and one copy is sent to the appropriate District Office. The maps may be one of three types: Flood Insurance Rate Maps (FIRMs), Flood Boundary and Floodway Maps (FBFMs), or Flood Hazard Boundary Maps (FHBMs). FHBMs are used when detailed studies have not been performed, no floodway has been developed, and floodplain boundaries are approximate. FIRMs and FBFMs are used when a detailed study hasb been perfomed and a floodway has been developed and show the boundaries of both the floodplain and the floodway. Special flood hazard areas are shown as Zone A on FHBMs and as Zone A or Zones A1 through A30 on FIRMs and FBFMs.

A current list of communities participating in the NFIP is available on the Internet at www.fema.gov/home/fema/csb.htm. This list should be consulted to determine if any communities within the project limits are participating in the NFIP. For all participating communities, the maps which include a portion of the project should be checked to determine if the project is within a special flood hazard area. If so, a floodplain development permit is required.

If any portion of the project is to be constructed within the regulatory floodway, the construction cannot cause an increase in the BFE and a No-Rise Certification will be required by SEMA. The Bridge Division will insure that structures to be constructed in a regulatoryfloodway comply with NFIP regulations. They will advise the district at the bridge memo stage if the construction is in a NFIP regulated floodway. It is the district's responsibility to insure that roadway fills to be constructed in a regulatory floodway comply with the NFIP regulations. The Bridge Division may be contacted for assistance in making this determination and in performing any necessary hydraulic analysis.

The process for reviewing floodway maps is summarized below:

- Check all communities within project limits to see if participating in NFIP.
- If participating, check maps (FIRMs, FBFMs, FHBMs).
- If in special flood hazard area, floodplain development permit is required.
- If in regulatory floodway, can cause no increase in BFE. No-Rise Certification is required. Floodway revision may be required.

**4-09.23 GEOGRAPHIC REFERENCE SYSTEM (GRS) MONUMENTS.** In order to aid in the reestablishing of the alignment in the future, permanent GRS monuments are constructed as part of the roadway contract for all projects that are developed on the state plane coordinate system. Projects designed using an independent grid system do not require the installation of these monuments.

These monuments are cast in place concrete cylinders with a reference cap and are set flush with the ground. The monument will be furnished by the commission and constructed by the contractor in accordance with the standard plan. The photogrammetric survey party will stamp the cap, set a witness post and obtain the Global Positioning System (GPS) information on each of the monuments and furnish this data to the Department of Natural Resources, Missouri Land Survey, (DNR/MLS), for their use in computing the state plane coordinates for each monument. DNR/MLS will keep the documentation and records of the monument as well as relocate the monument, if necessary, in the future. The monuments are set in pairs of intervisible monuments which are separated by no more than one kilometer (0.6 mile) and have a direct line of sight between the two monuments. This distance from one pair to the next pair will not exceed 3.5 km (2 miles). The district notifies photogrammetry whenever a monument will be disturbed by construction.

The designer shows the approximate location of the pairs of intervisible monuments on the plans by standard symbol. The standard symbol is an open hexagon containing an arrow which is pointed to the other monument of the intervisible pair in order to readily ascertain which monuments belong to the pair. The pairs are positioned such that they will remain intervisible and as secure from future disturbance as possible. The adjoining pairs do not necessarily need to be intervisible, however, pairs may be interconnected by means of a common monument. It is the intent that a surveyor can utilize any one of the monuments of the intervisible pair and sight on the other monument for grid bearing (azimuth) and from there will be able to reestablish the existing alignment.

**4-09.24 DISTRIBUTION POLICY.** The Design Division will maintain a list of all parties receiving documents in accordance with this policy. The maintenance of this list and the issuance of documents, including future updates to them, will be the responsibility of the Design Division. Updates to Standard Plans will only be provided as 8 1/2" x 11" sheets regardless of the size obtained under this policy.

**4-09.24 (1) POLICY PROCEDURE AND DESIGN MANUAL, STANDARD SPECIFICATIONS, AND STANDARD PLANS**

**4-09.24 (1) (a) CONSULTING ENGINEERING FIRMS CURRENTLY PERFORMING SERVICES FOR MoDOT.** One copy each of the Policy Procedure and Design Manual (Volumes I, II & III), Standard Specifications book (with 8 1/2" x 11" revisions if applicable) and Standard Plans (8 1/2" x 11" sheets) along with subsequent updates will be provided free of charge to each of the consulting engineering firm's offices performing services for MoDOT. (One per firm per office location with an active contract.) Either a Metric or English version of the documents will be provided depending on the type of deliverables specified in the scope of services.

If an engineering firm requests multiple copies of these documents (more than one per firm per office location with an active contract), they will be charged the normal rate for these additional copies. Once additional copies are purchased, updates will be provided free of charge.

If an engineering firm requests additional copies of specific sheets or sections from any of these documents, they will be furnished, but charged for copies at the normal rate.

Once a copy of any of these documents is obtained by the consulting engineering firm, either free or purchased, MoDOT will provide subsequent updates for each copy of each document free of charge.

**4-09.24 (1) (b) CONSULTING ENGINEERING FIRMS NOT CURRENTLY PERFORMING SERVICES FOR MoDOT.** Consulting engineering firms who have previously performed services for MoDOT, and have retained copies of the Policy Procedure and Design Manual, Standard Specifications book (with 8 1/2" x 11" revisions if applicable), or Standard Plans (8 1/2" x 11" sheets), will be provided future updates free of charge, provided that the copies have been maintained and kept up to date by the consultant. Only English or Metric versions of the updates will be provided free of charge, depending on the version of the documents retained by the consultant.

Consulting engineering firms who have not performed services for MoDOT or who have not maintained the copy of documents they retained from a previous contract, may purchase any number of copies of the Policy Procedure and Design Manual, Standard Specifications book (with 8 1/2" x 11" revisions if applicable), or Standard Plans in either version at the normal rate. Once documents are purchased, updates for each copy of each document will be provided free of charge.

If an engineering firm requests multiple copies of specific sheets or sections from any of these documents, they will be furnished, but charged for copies at the normal rate.

**4-09.24 (1) (c) COUNTIES AND CITIES.** One copy of the Policy Procedure and Design Manual (Volumes I, II, & III), Standard Specifications book (with 8 1/2" x 11" revisions if applicable), and Standard Plans (8 1/2" x 11" sheets) along with subsequent updates, will be made available to counties and cities upon written request free of charge. The availability of these documents can be communicated verbally through our district liaison engineers. The cost of the documents including handling and mailing, will be provided through the $T^2$ Program.

If a city or county requests multiple copies of any of these documents, they will be charged the normal rate for the additional copies. Once additional copies are purchased, updates for each copy of each document will be provided free of charge.

If a county or city requests additional copies of specific sheets or sections from any of these documents, they will be furnished, but charged for copies at the normal rate.

**4-09.24 (1) (d) OTHER GOVERNMENTAL AGENCIES (FHWA, transportation departments from other states, AGC, CECMo and other affiliated agencies).** One copy of the Policy Procedure and Design Manual, Standard Specifications book (with 8 1/2" x 11" revisions if applicable) and Standard Plans (8 1/2" x 11" sheets) and subsequent updates, will be furnished to these groups or agencies free of charge upon written request. The Division Engineer, Design, shall have the final decision with regard to which affiliated or governmental agencies will receive copies of these documents free of charge.

If any of these agencies request multiple copies of any of these documents, they will be charged the normal rate for the additional copies. Once additional copies are purchased, updates for each copy of each document will be provided free of charge.

If any of these agencies requests additional copies of specific sheets or sections from any of these documents, they will be furnished, but charged for copies at the normal rate.

**4-09.24 (1) (e) OTHERS.** Any group or individual not listed above, who requests copies of the Policy Procedure and Design Manual, Standard Specifications book (with 8 1/2" x 11" revisions if applicable), or Standard Plans will be furnished the requested number of copies and charged the normal rate for each document.

Once copies of these documents are purchased, updates for each copy of each document will be provided free of charge if requested at the time of purchase.

Complete new versions of any of these documents will not be considered as updates to existing copies previously purchased under this policy. The decision with regard to who receives new versions of documents free of charge and who must purchase them, will be made by the Division Engineer, Design, at the time the new versions are issued.

If additional copies of specific sheets or sections from any of these documents are requested, they will be furnished, but charged for copies at the normal rate.

Construction contractors who obtain copies of the Standard Specifications book or Standard Plans will not be mailed updates to these two publications. Their updates will be included with each bid proposal they obtain for the department's construction projects.

**4-09.24 (2) LOCAL PUBLIC AGENCY MANUAL (LPA)**

**4-09.24 (2) (a) CONSULTING ENGINEERING FIRMS.** Any number of copies of the LPA Manual will be distributed to consulting engineering firms upon request. The consulting engineering firm will be required to pay the normal rate for each copy of the LPA Manual. Once copies are purchased, updates for each copy of the manual will be provided free of charge.

If a consulting engineering firm requests additional copies of specific sheets or sections from the LPA Manual, they will be furnished, but charged for copies at the normal rate.

**4-09.24 (2) (b) COUNTIES AND CITIES.** One copy of the LPA Manual and subsequent updates will be made available to counties and cities free of charge upon written request. The availability of manuals can be communicated verbally through our district liaison engineers. The cost of the manuals, including handling and mailing, will be provided through the $T^2$ Program.

If a city or county requests multiple copies of the LPA Manual, they will be charged the normal rate for the additional copies. Once additional copies are purchased, updates for each copy of the manual will be provided free of charge.

If a county or city requests additional copies of specific sheets or sections from the LPA Manual, they will be furnished, but charged for copies at the normal rate.

**4-09.24 (2) (c) OTHER GOVERNMENTAL AGENCIES (FHWA, transportation departments from other states, AGC, CECMo and other affiliated agencies).** One copy of the LPA Manual and subsequent updates, will be furnished to these groups or agencies free of charge upon written request. The Division Engineer, Design, shall have the final decision with regard to which affiliated or governmental agencies will receive copies of these documents free of charge.

If any of these agencies request multiple copies of the LPA Manual, they will be charged the normal rate for the additional copies. Once additional copies are purchased, updates for each copy of the manual will be provided free of charge.

If any of these agencies requests additional copies of specific sheets or sections from the LPA Manual, they will be furnished, but charged for copies at the normal rate.

**4-09.24 (2) (d) OTHERS.** Any group or individual not listed above, who requests copies of the LPA Manual will be furnished the requested number of copies and charged the normal rate for each document. Once copies of the LPA Manual are purchased, updates for each copy of the manual will be provided free of charge if requested at the time of purchase.

Complete new versions of the LPA Manual will not be considered as an update to existing copies previously purchased under this policy. The decision with regard to who receives new versions of the manual free of charge and who must purchase them, will be made by the Division Engineer, Design, at the time the new version is issued.

If additional copies of specific sheets or sections from the LPA Manual are requested, they will be furnished, but charged for copies at the normal rate.

**4-09.24 (3) JOB SPECIAL PROVISIONS.** Consulting engineering firms currently performing services for MoDOT, either as a prime consultant or as a subconsultant, may receive one set of Job Special Provisions, along with subsequent updates, free of charge to each of the consulting engineer's offices performing services for MoDOT upon written request. (One per firm per office location with an active contract.) Either a Metric or English Version of the set of provisions will be provided depending on the type of deliverables specified in the scope of services.

If an engineering firm requests multiple copies of these provisions (more than one per firm per office location with an active contract), they will be charged the normal rate for these additional copies. Once additional copies are purchased, updates will be provided free of charge.

**4-09.24 (4) PRO-CADAM "FORMATS/SPECIAL SHEETS".** Consulting engineering firms currently performing services for MoDOT, either as a prime consultant or as a subconsultant, may receive vellum reproducibles of any Pro-Cadam file in the "Format & Special Sheets" directory free of charge to each of the consulting engineer's offices performing services for MoDOT upon written request. (One vellum of each file requested per firm per office location with an active contract.) Either Metric or English Version of the files will be provided depending on the type of deliverables specified in the scope of services.

**4-09.25 PROPRIETARY ITEMS.** A patented material, specification, or process that can only be obtained from one manufacturer is known as a proprietary item. Such Items can generally be identified by use of a trade name. In the interest of promoting competition and allowing for the development of new products, the FHWA will not participate in payment for any proprietary item except in the following cases.

- The state certifies that the proprietary item is essential for synchronization with the existing highway facilities and that no equally suitable alternative exists.
- The proprietary item is used for research or for a special type of construction on relatively short sections of road.
- Only proprietary items are acceptable, and at least three or more other proprietary items are offered as alternatives.
- The proprietary item is offered as an alternative to an equally suitable non-proprietary item.
- The FHWA finds that the utilization of the proprietary item is in the public interest.

**4-09.26 PUBLIC INTEREST FINDINGS.** In order to demonstrate to the FHWA that the utilization of a proprietary item is in the public interest, the district must submit a letter of public interest finding to the Design Division. The division will review the letter and submit it to the FHWA, or request additional information from the district, before submission.

The successful letter must include the brand name and manufacturer of the item in question as well as a detailed discussion of the factors that necessitate the item's use (synchronization with existing facilities, no equally suitable alternative available, substantial cost savings, benefit/cost analysis when more than one proprietary item is available, etc.). This discussion should be supported by any relevant figures and documentation, and should be as

complete and detailed as possible. In order to expedite the processing of the request, the letting date should be included. A sample letter for submittal to the Design Division is shown in Figure 4-09.10.

The district will be notified of the decision of the FHWA.